Astronomy: Earth and Space Systems

8-4 The student will demonstrate an understanding of the characteristics, structure, and predictable motions of celestial bodies. (Earth Science)

8.4.2 Summarize the characteristics of the surface features of the Sun: photosphere, corona, sunspots, prominences, and solar flares.
Taxonomy level: 2.4-A, B Understand Factual & Conceptual Knowledge

Previous/Future knowledge: In 1st grade (1-3.1), the Sun was a feature in the daytime sky. In 4th grade (4-3.2), the Sun, a star, is compared to Earth. Studying nuclear fusion in stars and the formation of elements from that fusion is part of high school Earth Science (ES-2.4).

It is essential for students to know the characteristics of the surface features of the Sun.
The Sun's atmosphere includes the photosphere and the corona:

- The *photosphere* emits light and is the most prominent layer of the Sun's atmosphere.
- During a total eclipse when the photosphere is blocked, the *corona*, the outer layer of the Sun's atmosphere that looks like a white halo, can be seen.

Other features on or above the Sun's surface are sunspots, prominences, and solar flares.

- *Sunspots* are areas of gas on the sun that are cooler than the surrounding gases and therefore do not give off as much light and appear as dark spots on the photosphere.
- *Prominences* are huge, looping eruptions of gas, usually near sunspots, that arch out from the photosphere into the outer layers of the Sun's atmosphere.
- *Solar flares* are explosions of hot gas that occur when prominences connect. They shoot from the Sun's surface releasing tremendous amounts of energy into space.

It is not essential for students to know the layers of the Sun's interior, nor the specific temperature data of the Sun's layers. The nuclear fusion process that releases the light and heat does not need to be explained. Since the chromosphere is so seldom visible, it is not being dealt with in this indicator.

Assessment Guidelines:
The objective of this indicator is to *summarize* the characteristics of the surface features of the Sun; therefore, the primary focus of assessment should be to generalize major points about these characteristics (including photosphere, corona, sunspots, prominences, and solar flares). However, appropriate assessments should also require students to *interpret* a diagram containing these features; *compare* these features; or *identify* the feature based on its unique characteristics.